



How to grow bigger yabbies and improve farm income

Large yabbies generate higher prices per kilo for farmers. However, many yabbies trapped from farm dams are below market size (<30 g) and therefore of no economic value. This document highlights ways of increasing the size and yield of yabbies and complements the book 'Yabby Farming - Frequently Asked Questions' by Lawrence and Morrissy (2000).

The five key measures are:

1. Manage your stocks to control density
2. Improve feeding regimes
3. Improve conditions in farm dams
4. Increase harvesting
5. Use good dams

1. Manage your stocks to control density

1a. Use trapping methods to control density and increase yields of marketable yabbies

- Growth rates of yabbies are reduced at higher densities; reducing the number of yabbies in your dam produces more large yabbies.
- Density is the most significant factor reducing the value of yabbies harvested from farm dams. Density has twice the influence on yabby growth as the industry standard feeding regime.
- Trapping farm dams every six weeks reduces the density and increases the size of yabbies. Regular trapping can double the value of yabbies harvested from your ponds.
- Farmers usually sell all the market-size yabbies caught in their traps and return undersize animals to the dam. However, as trapping removes the largest male yabbies this creates a population structure where a high proportion of the yabbies are breeding females and small males. Unfortunately this approach maintains high densities, may cause negative genetic selection and lower growth rates in future offspring. Two ways of avoiding these problems are:
 1. Remove all yabbies caught in your traps, regardless of their size. This will give around 25 per cent increase in value.
 2. Return the largest 10 per cent of male and female yabbies caught in your traps back into the dam to breed, while removing all the small animals you catch. This will produce larger yabbies and provide around a 10 per cent increase in the value of yabbies sold. Returning the largest yabbies should improve the genetic quality of your broodstock and over the long-term result in faster growing yabbies.

1b. Male yabbies in isolation grow much faster than females or mixed sex stock

A low cost method for overcoming breeding and high densities in farm dams is monosex culture (i.e. separating male and female yabbies and placing them into a different pond or dam). The yabbies in these monosex dams will grow much faster, but will not breed, so the dams will need to be topped up with more males (in the male only dams) or females (in the female only dams) throughout the year.



The advantages of monosex culture are:

- When males and females are separated, male yabbies grow about 15 per cent faster than males in mixed sex dams, and female yabbies grow about 30 per cent faster than those in mixed sex farm dams.
- In monosex culture, male yabbies grow about 70 per cent faster than female yabbies.
- Monosex culture provides a 70 per cent increase in gross return to the farmer.

Note: This method can only work in new dams stocked for the first time or older dams where the high density stunted stock have been fully eradicated.

1c. All male hybrid yabbies – a future opportunity

Separating males and females by hand is time-consuming and prone to mistakes. To make this easier and more accurate, a hybrid has been discovered that only produces male progeny (by crossing male WA yabbies *Cherax albidus* with female *Cherax rotundus* yabbies from NSW). In research ponds, hybrids grew twice as fast as a mixed sex population. Broodstock are being produced by the Department of Fisheries to allow commercial producers to supply hybrid juveniles to farmers. For quarantine reasons, farmers cannot bring their own *Cherax rotundus* broodstock into this State without formal translocation approval from the Department of Fisheries.

2. Improve feeding regimes

2a. Feeding improves yabby harvests

- Feeding improves the productivity of farm dams. The current industry standard feeding regime, based upon lupins, gives around 30 per cent better growth than not feeding.
- Growth rates can be increased further by using improved diets and increased feed rates.
- Yabbies fed locally produced crayfish pellets grow 20 per cent faster than those fed lupins. Alternatively, farmers can produce their own diets using a high proportion of farm produce. A 'home-made' formulation consisting of 30 per cent fish meal, 48.48 per cent oat flour, 20 per cent lupin flour, 1.5 per cent betaine (an attractant) and 0.02 per cent vitamin C made into pellets produces yabbies of a similar size and value to those fed commercial crayfish pellets in research ponds. In commercial farm dams, the growth advantage of using home-made pellets instead of lupins was not as great, indicating that there are other important factors which also affect yabby production in dams (see section 5 below).
- Some farmers add ground agricultural products (oats, wheat, and meat meal) not formed into pellets. This gives poorer growth than pellets.

2b. How much feed should I use?

- Increased feed rates are important for improving the production of yabbies from farm dams. The yield and value of yabbies from dams increased when feed rates of lupins during summer were greater than 8 g/m²/week (m² = square metre). A feeding schedule has been developed (see boxes below) that can be used in an average farm dam that has good exposure to the prevailing winds, low bank heights and has not experienced organic pollution from summer thunderstorms. The rates below can be used directly for a 1,000 m² dam. If square, such dams have a perimeter of about 130 m at waters edge. Try to spread the feed evenly as



you walk around the dam throwing it onto the water surface, one to three metres from the water's edge.

Freshwater crayfish pellets		OR	Lupins	
Season	Feed rate		Season	Feed rate
	kg/1,000m²dam/week			kg/1,000m²dam/week
Spring	7.5		Spring	10
Summer	6		Summer	8
Autumn	3		Autumn	4
Winter	1.5		Winter	2

Research has shown that freshwater crayfish pellets are twice as efficient as lupins, however lupins are preferable to not feeding, and are popular with some farmers.

The amount of feed added to your dams should be adjusted regularly as the water levels decrease over summer due to stock drinking or evaporation. Overfed shallow dams could become unfavourable for watering livestock. Dams that are very green and have an odour resembling rotten eggs should not be fed, but may be trapped to reduce the density of yabbies.

2c. Are there any ways of 'automatically' feeding my yabby dams?

'Automatic feeders' for yabby dams have been developed and trialled different. Two examples are:

1. A compressed feed brick, designed to be fed every six weeks and made using locally available ingredients and techniques, produced yabbies 10 per cent larger and about 30 per cent more valuable than those reared by weekly hand feeding.
2. An electronic automatic feeder which spread pellets into the dam using a battery powered motor gave good survival and reasonable growth of yabbies, producing about 20 per cent more market sized yabbies compared with weekly handfeeding, but increases investment costs.

3. Improve conditions in farm dams

3a. How can I increase the oxygen levels in my dams and improve the quality of fouled yabbies?

- Yabby farming differs from most aquaculture as feed is added but no mechanical aeration is used. An additional problem is that the water source is runoff, which can wash organic matter, eg. sheep manure and crop stubble, directly into the dam.
- High feeding rates (and organic rich runoff) in farm dams can cause a lack of dissolved oxygen. Calcium nitrate can increase dissolved oxygen levels in ponds and oxidise black sediments that contain little oxygen (anaerobic). This technology may permit higher feeding levels in dams without mechanical aeration.
- Calcium nitrate increases the bottom dissolved oxygen levels, and the depth of oxidised sediment (lighter coloured sediment) in both research ponds and in farm dams that have been organically enriched by runoff from summer thunderstorms.
- In research ponds, adding calcium nitrate gave a 30 per cent increase in the growth of yabbies whilst, in farm dams enriched by summer thunderstorms, calcium nitrate produced a higher percentage of saleable yabbies in traps and reduced ectocommusal fouling eg. *Epistylis* (see Lawrence and Morrissy, 2000). The best method of applying calcium nitrate is by adding it when you feed



(hopefully weekly) and adjusting the amount in response to the depth of oxidised sediment (using a clear hard plastic tube). The amount of calcium nitrate added should be enough to maintain the layer of light coloured sediment at around 2.5 cm. The quantity of calcium nitrate required will differ between dams; ongoing application rates should be approximately 1 g/m²/week, whilst highly enriched dams may require as much as 5 g/m²/week (1-5 kg/1,000m²dam/week).

- This approach is experimental and farmers should adapt it to suit their own dams. The price of calcium nitrate will depend on the scale of cooperative buying by groups of yabby growers as will the profitability of this method.
- Calcium nitrate poses no direct risk to livestock. However, it is a fertilizer and should not be over supplied or unfavourable algal blooms could result.
- Care should be taken when transporting calcium nitrate and diesel, because when mixed they become highly explosive.

4. Increase harvesting

4a. Which is the best way to trap yabbies?

Farmers trap more yabbies on banks where they place more traps, invariably this is the front bank of the dam. Farmers should spread their traps out evenly around the dam with one trap every 10 m (see Lawrence and Morrissy, 2000). A six-weekly trapping regime has given good results for both the growth rates and value of yabby catches from ponds.

4b. Can I trap my yabbies in winter?

Yabbies can be trapped throughout winter, and although the size of yabbies in winter is slightly smaller, there is no difference in the value of the catch. So, if you are not trapping in cooler months, you could double your income by trapping all year. The yabby industry is now adopting this strategy. As for summer, farmers should continue to trap dams every six weeks during winter.

5. Use good dams

5a. What are the important factors limiting yabby production in farm dams (i.e. what is a productive dam?)

Many farmers have kindly maintained records of management, production, and site characteristics for the Department's farm dam logbook study. Key results are:

- **Feed**
Low and infrequent feeding rates depress production. The height of the dam on the catchment may affect yabby growth; dams low on the catchment receive more run-off and grow bigger yabbies, due to increased feed from organic matter and fertilizers entering the dam.
- **Aeration**
Farm dams vary greatly in bank height (relative to surrounding ground level), freeboard (vertical distance from water level to top of bank) and orientation to prevailing winds. Low wind exposure and high banks prevent wind mixing (aeration) and cause low dissolved oxygen levels, reducing yabby growth.
- **Production area**
Small dams yield fewer yabbies, but very large dams had less production per unit area. This is because the shallow areas can be more favourable than the deeper cold areas in large dams.



- **Density**
High densities of yabbies reduce growth rates. Apart from all male dams, the way of avoiding excessive densities is regular trapping (see 1a. above).
- **Water supply and quality**
The chemical composition of water in some dams may limit yabby production. However, compared with the water chemistry, the management and physical factors listed above are more important in limiting yabby production from WA farm dams. Dams with the capacity to produce larger catches of yabbies tend to have high chlorophyll (algal) levels. Areas with a high annual rainfall produce smaller catches. High levels of chloride, copper, zinc and iron all reduce the yabby production from commercial dams.
- **Location**
Dams north of Cranbrook have good production, whilst those north of Hyden produce even more yabbies. Dams located towards the south coast have the lowest production. This is probably due to higher water temperatures further north.

5b. Should I shift yabbies between dams?

1. In general, high density is a much more common problem than low densities of yabbies (see section 1 above).
2. Adding yabbies to dams had a benefit in only a small number (10 per cent) of extremely productive, well-aerated and well-fed dams. Farmers should exercise caution when moving yabbies so as to avoid high densities and reduced growth.
3. There is a potential risk associated with transferring a disease called *Thelohania* when shifting yabbies among dams, and farmers should avoid shifting yabbies between farms to reduce this risk. With 'male only' hybrid yabbies (see 1b.), we are developing *Thelohania*-free lines to avoid this restriction.

5c. Salty dams can be used to grow-out yabbies

Saline dams (more than 2 ppt or 140 grains/gallon) usually have poor production of juveniles, and consequently only one or two catches of good-sized yabbies per season are obtained from such dams. However, these dams are good for grow-out of surplus below market-sized yabbies (eg. those caught in traps and not returned to the same lower salinity dam). This is because there is less chance of them becoming overcrowded, as there is little reproduction of yabbies in salty dams.

General conclusions

It is possible to convert yabbies below market size (<30 g) to high-value animals by improving feeding and management practices. The techniques described will produce larger yabbies and directly result in increased returns to farmers. In addition, the increase in market size yabbies from farm dams will provide a higher catch rate from traps. Consequently, the harvesting of yabbies from more isolated dams will become economically viable.

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Recommended reading



Government of **Western Australia**
Department of **Fisheries**

(Most of the following references are available from the Department of Fisheries library).

Lawrence, C.S., Morrissy, N.M., Bellanger, J.E. and Cheng, H. (1998). *Enhancement of Yabby Production from Western Australian Farm Dams*. Fisheries Research Report 94/75, Fisheries WA, Perth, Western Australia. 159 pp.

Lawrence C.S. & Morrissy, N.M. (2000). *Yabby Farming – Frequently asked Questions*. Fisheries WA, Perth, Western Australia. 56 pp.

Lawrence C.S., Cheng, Y.W., Bellanger, J.E., Cole, N.M. and Seidel, S.T. (2001). *Feeding and Management Practices to Enhance Yabby Production from Farm Dams*. Fisheries Research Contract Report 97/319. Department of Fisheries, Perth, Western Australia 206 pp.

Lawrence C.S. (2001). *Yabby Hybrid Grow-out Experiment*. Project No. 41. Fisheries Research Contract Report No. 11. Department of Fisheries, Perth, Western Australia. 99 pp.